

In re Patent Application of
LETOR ET AL.
Serial No. **NOT YET ASSIGNED**
Filed: **HEREWITH**

Listing of the Claims:

This listing of claims replaces all prior versions and listing of claims in the application.

Claims 1-16 (canceled).

17. (new) A method for detecting variations of the torque of a DC motor, comprising:

generating a first signal representing the current flowing in the motor;

multiplying the first signal with a pre-established function to produce a product signal;

generating a comparison signal to correspond to a slope of the product signal; and

signaling a torque variation if the comparison signal surpasses a certain threshold.

18. (new) The method of claim 17, wherein the comparison signal is the difference between the product signal and a moving average thereof over a certain time interval.

19. (new) The method of claim 18, wherein a duration of the time interval is greater than a maximum time constant of torque to be ignored and smaller than a minimum time constant of torque to be detected.

20. (new) The method of claim 17, wherein the pre-established function is a saturated linear ramp function,

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which is null when the motor is switched on and saturates when a start-up phase of the motor ends.

21. (new) The method of claim 19, wherein the duration ranges between 10-200 milliseconds.

22. (new) The method of claim 17, further comprising filtering noise from the first signal before multiplying it with the pre-established function.

23. (new) The method of claim 22, wherein filtering comprises filtering the first signal with a low-pass filter having a time constant in a range between 0.5-10 milliseconds.

24. (new) The method of claim 17, further comprising accelerating the motor during a start-up phase by supplying it with a linear saturating ramp voltage.

25. (new) A method for detecting a blocked condition of a DC motor, comprising:

detecting an increase of motor torque by

generating a first signal representing the current flowing in the motor,

multiplying the first signal with a pre-established function to produce a product signal,

generating a comparison signal to correspond to a slope of the product signal, and

signaling a torque variation if the comparison signal surpasses a certain threshold; and

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signaling a blocked condition when an increase of the motor torque is detected.

26. (new) The method of claim 25, wherein the comparison signal is the difference between the product signal and a moving average thereof over a certain time interval.

27. (new) The method of claim 26, wherein a duration of the time interval is greater than a maximum time constant of torque to be ignored and smaller than a minimum time constant of torque to be detected.

28. (new) The method of claim 25, wherein the pre-established function is a saturated linear ramp function, which is null when the motor is switched on and saturates when a start-up phase of the motor ends.

29. (new) The method of claim 27, wherein the duration ranges between 10-200 milliseconds.

30. (new) The method of claim 25, further comprising filtering noise from the first signal before multiplying it with the pre-established function.

31. (new) The method of claim 30, wherein filtering comprises filtering the first signal with a low-pass filter having a time constant in a range between 0.5-10 milliseconds.

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32. (new) The method of claim 25, further comprising accelerating the motor during a start-up phase by supplying it with a linear saturating ramp voltage.

33. (new) A control circuit for detecting a torque variation of an electric DC motor, comprising:

sensing means for sensing the current flowing in the motor and generating a first signal;

first circuit means for generating a product signal of the first signal and a pre-established function;

second circuit means for generating a comparison signal to correspond to a slope of the product signal; and

a comparator to compare the comparison signal with a threshold, and signal a torque variation when the comparison signal surpasses the threshold.

34. (new) The control circuit of claim 33, wherein said first circuit means comprises a low-pass filter that outputs a noise filtered replica of the first signal.

35. (new) The control circuit of claim 34, wherein the low-pass filter generates the noise filtered replica signal to correspond to a moving average of the first signal and has a time constant that ranges between 0.5-10 milliseconds.

36. (new) The control circuit of claim 33, wherein said second circuit means comprises a low-pass filter to filter the product signal, and an adder that generates the

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comparison signal as the difference between the product signal and the filtered product signal.

37. (new) The control circuit of claim 36, wherein the low-pass filter generates the filtered product signal as a moving average thereof over a time interval having a duration greater than a maximum time constant of a torque to be ignored and smaller than a minimum time constant of a torque to be detected.

38. (new) The control circuit of claim 37, wherein the duration ranges between 10-200 milliseconds.

39. (new) The control circuit of claim 36, wherein the first circuit means comprises:

a waveform generator of a saturated linear ramp signal which is null when the motor is switched on and saturates when a start-up phase of the motor ends; and

a multiplier receiving the linear saturating ramp signal and the first signal, and generating the product signal.